CLAIMS

What is claimed is:

1. A method for adding routing information for a node to a routing table, wherein said routing table includes routing information reflecting an existing deadlock-free set of paths through a network of nodes, comprising:

adding a row of entries to said routing table, wherein said row includes a plurality of entries, each of said entries including forwarding information that describes how said node is to forward a data unit addressed to a corresponding destination node within said network of nodes, and wherein said forwarding information in said row of entries describes at least a portion of a first set of paths, and wherein a combination of said first set of paths together with said existing set of paths is deadlock-free; and

adding a column of entries to said routing table, wherein said column includes a plurality of entries, each of said entries including forwarding information that describes how a corresponding forwarding node within said network of nodes is to forward a data unit addressed to said node as a destination node, and wherein said forwarding information in said column of entries describes at least a portion of a second set of paths, and wherein a combination of said first set of paths, said second set of paths, and said existing paths is deadlock-free.

2. The method of claim 1, further comprising:

forming an ordered set of deadlock-free sub-topologies of said network, each sub-topology comprising links that are not used in any other sub-topology; and

generating said routing table in response to said ordered set of deadlock-free sub-topologies.

3. The method of claim 2, wherein said forming said ordered set of deadlock-free sub-topologies of said network further comprises forming at least one sub-topology of said network that is a spanning layer of said network.

4. The method of claim 3, further comprising maintaining a cost of a corresponding link between each of said nodes in said network within each entry of said routing table.

5. The method of claim 4, wherein said adding said column to said routing table further comprises:

for each entry within said column, performing the following steps

determining a set of cost values, wherein each value within said set of cost values reflects a sum of the cost of reaching a selected neighbor node of said node from said corresponding forwarding node and the cost of reaching said node from said selected neighbor node,

determining a minimum value of said set of cost values, and

determining forwarding information for said entry indicating said selected neighbor node associated with said minimum value.

6. The method of claim 4, wherein said adding said row to said routing table further comprises:

for each entry within said row, performing the following steps

determining a set of cost values, wherein each value within said set of cost values reflects a sum of the cost of reaching said corresponding destination node from a selected neighbor node of said node and the cost of reaching said selected neighbor node from said node,

determining a minimum value of said set of cost values, and

determining forwarding information for said entry indicating said selected neighbor node associated with said minimum value.

7. A system for adding routing information for a node to a routing table, wherein said routing table includes routing information reflecting an existing deadlock-free set of paths through a network of nodes, comprising routing logic operable to:

add a row of entries to said routing table, wherein said row includes a plurality of entries, each of said entries including forwarding information that describes how said node is to forward a data unit addressed to a

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corresponding destination node within said network of nodes, and wherein said forwarding information in said row of entries describes at least a portion of a first set of paths, and wherein a combination of said first set of paths together with said existing set of paths is deadlock-free; and

add a column of entries to said routing table, wherein said column includes a plurality of entries, each of said entries including forwarding information that describes how a corresponding forwarding node within said network of nodes is to forward a data unit addressed to said node as a destination node, and wherein said forwarding information in said column of entries describes at least a portion of a second set of paths, and wherein a combination of said first set of paths, said second set of paths, and said existing paths is deadlock-free.

8. The system of claim 7, wherein said routing logic is further operable to:

form an ordered set of deadlock-free sub-topologies of said network, each sub-topology comprising links that are not used in any other sub-topology; and

generate said routing table in response to said ordered set of deadlock-free sub-topologies.

9. The system of claim 8, wherein said routing logic is further operable to form said ordered set of deadlock-free sub-topologies of said network further by forming at

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least one sub-topology of said network that is a spanning layer of said network.

10. The system of claim 9, wherein said routing logic is further operable to maintain a cost of a corresponding link between each of said nodes in said network within each entry of said routing table.

11. The system of claim 10, wherein routing logic operable to add said column to said routing table is further operable to perform the following steps for each entry within said column:

determine a set of cost values, wherein each value within said set of cost values reflects a sum of the cost of reaching a selected neighbor node of said node from said corresponding forwarding node and the cost of reaching said node from said selected neighbor node;

determine a minimum value of said set of cost values; and

determine forwarding information for said entry indicating said selected neighbor node associated with said minimum value.

12. The system of claim 10, wherein said routing logic operable to add said row to said routing table is further operable to perform the following steps for each entry within said row:

determine a set of cost values, wherein each value within said set of cost values reflects a sum of the cost of reaching a corresponding node from a selected neighbor

node of said node and the cost of reaching said selected neighbor node from said node;

determine a minimum value of said set of cost values; and

determine forwarding information for said entry indicating said selected neighbor node associated with said minimum value.

13. The system of claim 7, wherein said routing logic comprises at least one digital logic circuit.

14. The system of claim 7, wherein said routing logic comprises program code loaded into a memory of a computer system.

15. A system for adding routing information for a node to a routing table, wherein said routing table includes routing information reflecting an existing deadlock-free set of paths through a network of nodes, comprising routing logic operable to:

means for adding a row of entries to said routing table, wherein said row includes a plurality of entries, each of said entries including forwarding information that describes how said node is to forward a data unit addressed to a corresponding destination node within said network of nodes, and wherein said forwarding information in said row of entries describes at least a portion of a first set of paths, and wherein a combination of said

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first set of paths together with said existing set of paths is deadlock-free; and

means for adding a column of entries to said routing table, wherein said column includes a plurality of entries, each of said entries including forwarding information that describes how a corresponding node within said network of nodes is to forward a data unit addressed to said node as a destination node, and wherein said forwarding information in said column of entries describes at least a portion of a second set of paths, and wherein a combination of said first set of paths, said second set of paths, and said existing paths is deadlock-free.

16. A computer program product including a computer readable medium, said computer readable medium having a computer program stored thereon, said computer program for adding routing information for a node to a routing table, wherein said routing table includes routing information reflecting an existing deadlock-free set of paths through a network of nodes, said computer program comprising:

program code for adding a row of entries to said routing table, wherein said row includes a plurality of entries, each of said entries including forwarding information that describes how said node is to forward a data unit addressed to a corresponding destination node within said network of nodes, and wherein said forwarding information in said row of entries describes at least a

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portion of a first set of paths, and wherein a combination of said first set of paths together with said existing set of paths is deadlock-free; and

program code for adding a column of entries to said routing table, wherein said column includes a plurality of entries, each of said entries including forwarding information that describes how a corresponding node within said network of nodes is to forward a data unit addressed to said node as a destination node, and wherein said forwarding information in said column of entries describes at least a portion of a second set of paths, and wherein a combination of said first set of paths, said second set of paths, and said existing paths is deadlock-free.

17. A computer data signal embodied in a carrier wave, said computer data signal including a computer program stored, said computer program for adding routing information for a node to a routing table, wherein said routing table includes routing information reflecting an existing deadlock-free set of paths through a network of nodes, said computer program comprising:

program code for adding a row of entries to said routing table, wherein said row includes a plurality of entries, each of said entries including forwarding information that describes how said node is to forward a data unit addressed to a corresponding destination node within said network of nodes, and wherein said forwarding information in said row of entries describes at least a

portion of a first set of paths, and wherein a combination of said first set of paths together with said existing set of paths is deadlock-free; and

program code for adding a column of entries to said routing table, wherein said column includes a plurality of entries, each of said entries including forwarding information that describes how a corresponding forwarding node within said network of nodes is to forward a data unit addressed to said node as a destination node, and wherein said forwarding information in said column of entries describes at least a portion of a second set of paths, and wherein a combination of said first set of paths, said second set of paths, and said existing paths is deadlock-free.

18. A method for inserting routing information regarding a node into a routing table, wherein said routing table defines a deadlock-free set of paths through a network of nodes, comprising:

obtaining identification of at least one link operable to deliver data to said node;

obtaining identification of at least one link operable to convey data transmitted from said node;

storing said identification of said at least one link operable to deliver data to said node into a new highest layer within an ordered set of layers upon from which said deadlock-free set of paths are derived;

storing said identification of said at least one link operable to convey day transmitted from said node into a new lowest layer within said ordered set of layers

upon which said deadlock-free set of paths are derived; and

adding routing information to said forwarding table that reflects said new lowest layer and said new highest layer.

19. A method for inserting routing information regarding a unidirectional link into a routing table, wherein said routing table defines a deadlock-free set of paths through a network of nodes, comprising:

adding said unidirectional link into a new layer within an ordered set of layers upon from which said deadlock-free set of paths are derived; and

recalculating said deadlock-free set of paths in response to said adding of said unidirectional link into said new layer.

20. A method for inserting routing information regarding a bi-directional link into a routing table, wherein said routing table defines a deadlock-free set of paths through a network of nodes, wherein said bi-directional link is between a first node and a second node, comprising:

determining a first unidirectional link from said first node to said second node;

determining a second unidirectional link from said second node to said first node;

adding said first unidirectional link to a lowest layer within an ordered set of layers upon from which said deadlock-free set of paths are derived;

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adding said second unidirectional link to a highest layer within said ordered set of layers upon from which said deadlock-free set of paths are derived; and

recalculating said deadlock-free set of paths.

21. The method of claim 1, further comprising iteratively performing said steps of adding a row of entries and adding a column of entries in order to add routing information to said routing table for a plurality of nodes.

22. The method of claim 22, wherein said existing deadlock-free set of paths are through a network of two nodes.